

CLAIMS

1. A method for producing a substrate with black film, comprising forming a dull plating film on a surface
5 of a substrate, forming an electroless plating film containing a sulfur or nitrogen compound on the surface of said dull plating film, and forming a black film on the surface of said electroless plating film.
- 10 2. The production method as claimed in claim 1, wherein the dull plating film is a dull nickel plating film or a dull nickel alloy plating film.
- 15 3. The production method as claimed in claim 2, wherein the dull nickel plating film or dull nickel alloy plating film is formed by an electrolytic or electroless process.
- 20 4. The production method as claimed in claim 2 or 3, wherein the nickel alloy for forming the dull nickel alloy plating film is a nickel-phosphorus alloy, a nickel-boron alloy or a nickel-phosphorus-boron alloy.
- 25 5. The production method as claimed in claim 1, wherein the electroless plating film is an electroless nickel plating film or an electroless nickel alloy plating film.

6. The production method as claimed in claim 5,
wherein the nickel alloy for forming the electroless
nickel alloy plating film is a nickel-phosphorus alloy, a
5 nickel-boron alloy or a nickel-phosphorus-boron alloy.

7. The production method as claimed in claim 1,
wherein the black film is a black film mainly comprising
a nickel oxide.

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8. A method for producing a substrate with black
film, comprising forming an electroless plating film
containing a sulfur or nitrogen compound as an additive
on a surface of a substrate having asperities formed on
15 at least a part of the surface thereof, and forming a
black film on the surface of said electroless plating
film.

9. The production method as claimed in claim 8,
20 wherein the asperities on the substrate surface are
formed by shot-blasting or etching the surface.

10. The production method as claimed in claim 8,
wherein the electroless plating film is an electroless
25 nickel plating film or an electroless nickel alloy
plating film.

11. The production method as claimed in claim 10,
wherein the electroless nickel alloy plating film is at
least one plating film selected from the group consisting
of a nickel-phosphorus alloy film, a nickel-boron alloy
5 film and a nickel-phosphorus-boron alloy film.

12. The production method as claimed in claim 8,
wherein the black film is a black film mainly comprising
a nickel oxide.
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13. A method for producing a substrate with black
film, comprising forming a dull composite plating film on
a surface of a substrate, forming an electroless plating
film containing a sulfur or nitrogen compound on the
15 surface of said dull composite plating film, and forming
a black film on the surface of said electroless plating
film.

14. The production method as claimed in claim 13,
20 wherein the dull composite plating film is a dull plating
film obtained by co-depositing an electrically non-
conducting particle.

15. The production method as claimed in claim 14,
25 wherein the dull composite plating film is a dull
composite nickel plating film or a dull composite nickel
alloy plating film.

16. The production method as claimed in claim 15,
wherein the dull composite nickel plating film or dull
composite nickel alloy plating film is formed by an
5 electrolytic or electroless process.

17. The production method as claimed in claim 15
or 16, wherein the alloy for forming the dull composite
nickel alloy plating film is a nickel-phosphorus alloy, a
10 nickel-boron alloy or a nickel-phosphorus-boron alloy.

18. A substrate with black film, comprising a
substrate having on the surface thereof a dull plating
film, an electroless plating film containing a sulfur or
15 nitrogen compound formed on the surface of said dull
plating film, and a black film formed on the surface of
said electroless plating film.

19. The substrate with black film as claimed in
20 claim 18, wherein the dull plating film is a dull nickel
plating film or a dull nickel alloy plating film.

20. The substrate with black film as claimed in
claim 18, wherein the dull nickel plating film or dull
25 nickel alloy plating film is formed by an electrolytic or
electroless process.

21. The substrate with black film as claimed in claim 19 or 20, wherein the nickel alloy for forming the dull nickel alloy plating film is a nickel-phosphorus alloy, a nickel-boron alloy or a nickel-phosphorus-boron alloy.

22. The substrate with black film as claimed in claim 18, wherein the electroless plating film is an electroless nickel plating film or an electroless nickel alloy plating film.

23. The substrate with black film as claimed in claim 22, wherein the nickel alloy for forming the electroless nickel alloy plating film is a nickel-phosphorus alloy, a nickel-boron alloy or a nickel-phosphorus-boron alloy.

24. The substrate with black film as claimed in claim 18, wherein the black film is a black film mainly comprising a nickel oxide.

25. A substrate with black film, comprising a substrate having asperities formed on at least a part of the surface thereof and having on the surface thereof an electroless plating film containing a sulfur or nitrogen compound as an additive, and a black film formed on the surface of said electroless plating film.

26. The substrate with black film as claimed in claim 25, wherein the asperities on the substrate surface are formed by shot-blasting or etching the surface.

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27. The substrate with black film as claimed in claim 25, wherein the electroless plating film is an electroless nickel plating film or an electroless nickel alloy plating film.

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28. The substrate with black film as claimed in claim 27, wherein the electroless nickel alloy plating film is at least one plating film selected from the group consisting of a nickel-phosphorus alloy film, a nickel-boron alloy film and a nickel-phosphorus-boron alloy film.

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29. The substrate with black film as claimed in claim 25, wherein the black film is a black film mainly comprising a nickel oxide.

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30. A substrate with black film, comprising a substrate having on the surface thereof a dull composite plating film, an electroless plating film containing a sulfur or nitrogen compound formed on the surface of said dull composite plating film, and a black film formed on the surface of said electroless plating film.

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31. The substrate with black film as claimed in claim 30, wherein the dull composite plating film is a dull plating film containing an electrically non-conducting particle.

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32. The substrate with black film as claimed in claim 30, wherein the dull composite plating film is a dull composite nickel plating film or a dull composite nickel alloy plating film.

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33. The substrate with black film as claimed in claim 32, wherein the dull composite nickel plating film or dull composite nickel alloy plating film is formed by an electrolytic or electroless process.

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34. The substrate with black film as claimed in claim 32 or 33, wherein the alloy for forming the dull composite nickel alloy plating film is a nickel-phosphorus alloy, a nickel-boron alloy or a nickel-phosphorus-boron alloy.

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35. The substrate with black film as claimed in any one of claims 18 to 34, which has a fluorinated passive film on the surface of the black film.

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36. The substrate with black film as claimed in any one of claims 18 to 35, wherein the substrate is

aluminum, aluminum alloy, copper, stainless steel,
plastic or ceramic.

37. A heat exchanger component having on the
5 surface thereof the substrate with black film claimed in
any one of claims 18 to 36.

38. An optical device component having on the
surface thereof the substrate with black film claimed in
10 any one of claims 18 to 36.

39. A rotating device or sliding component having
on the surface thereof the substrate with black film
claimed in any one of claims 18 to 36.